NEWS AT A GLANCE

Forthcoming Events:

1) **FUTORES II — Future understanding of tectonics, ores, resources, environment and sustainability**
04 Jun 2017 - 07 Jun 2017,
Townsville, Australia
Contact Email: futores2@jcu.edu.au
Topics: New Insights in Mineral Deposit Understanding, New Technologies and Approaches in Mineral Exploration, Tectonics and Metallogenesis, Basins and Energy, Future Trends in the Minerals Industry
Event website: http://www.jcu.edu.au/futores.

2) **European Geosciences Union (EGU) General Assembly**
23 Apr 2017 - 28 Apr 2017
Vienna, Austria
Abstract: The EGU General Assembly will bring together geoscientists from all over the world to one meeting covering all disciplines of the Earth, planetary and space sciences. The EGU aims to provide a forum where scientists, especially early career researchers, can present their work and discuss their ideas with experts in all fields of geoscience.
Event website: http://www.egu2017.eu/

3) **GeoConvention 2017**
15 May 2017 - 19 May 2017
Calgary, Alberta, Canada
Contact: Dustin Menger; Email: dustin@geoconvention.com
Topics: geoscience, CSPG, CSEG, CWLS, geology, geophysics, exhibition, exhibit, earth, science
Event website: http://www.geoconvention.com

4) **79th EAGE Conference & Exhibition 2017 Energy, Technology, Sustainability - Time to open a new Chapter**
12 Jun 2017 - 15 Jun 2017
Paris, France
Abstract: The energy mix is changing but the world will need every form of energy - both fossil and renewable- to meet its growing demands. Our ability to respond effectively to all the changes in our industry especially during this low oil and gas price cycle, determines whether we stay in a time of crises or move to that of opportunity. In order to survive and ultimately thrive again, we need to change and adapt our approaches and historical norms.
Event website: http://www.eage.org/event/index.php?eventid=1488&Opendivs=s3

5) **79th EAGE Conference & Exhibition 2017 Student Programme**
12 Jun 2017 - 15 Jun 2017
Paris, France
Abstract: EAGE provides students with the opportunity to gain knowledge, skills and contacts to pursue a career in geosciences and the engineering industry. The next opportunity for students will be the student programme at the 79th EAGE Conference & Exhibition from 12 June to 15 June 2017.
Event website: http://www.eage.org/event/index.php?eventid=1490&Opendivs=s3

6) **Engineering Geophysics 2017 Conference and Exhibition**
24 Apr 2017 - 28 Apr 2017
Kislovodsk, Russia
Event website: http://www.eage.org/event/index.php?eventid=1508&Opendivs=s3

Awards and Recognition

1) Dr. N. Purnachandra Rao, Chief Scientist and an AcSIR Professor at CSIR-NGRI has been selected for the "Prestigious National Geoscience Award" by the Ministry of Mines, Govt. of India.

2) Dr. A. Keshav Krishna, Scientist at CSIR-NGRI has been selected for the "Prestigious National Geoscience Award" by the Ministry of Mines, Govt. of India.

Space Science & Technology News

Space science & technology has witnessed phenomenal success in the last two decades, encouraging our space scientists to face new challenges in exploring planets of our solar system. In this process series of technological innovations are being tested regularly, following strict security norms in the laboratory. Many of these exercises carried out by highly motivated scientists and technical experts do only receive accolades when a mission is successful. Such a committed involvement is not seen in other fields of science and technology (except in communication) due to absence of an organised planning and execution mechanism. It is learnt that for any space expedition well articulated schedules are planned at least 5 years in advance, as many inter linking sequential procedures are to be fine tuned and precisely executed. When we closely observe the strides made by NASA and our own ISRO it is evident considerable efforts have been made to ensure success of a space expedition, amidst known and unknown impediments. Starting from selection of data acquisition gadgets of small and big dimensions and ensuring the success of minute execution procedures need optimum use of precision technology. For Chandrayan and Mangalyaan voyages to Moon and Mars respectively, planning of various procedures was started long time back following in house and at times international interactions, without compromising our own interests. If and when we want to send a rover to collect various types of data from Mars or even Moon it is essential for us to select precise landing sites, as done by NASA for its upcoming Mars 2020 mission. Since we have entered in the race to explore different planets and have a shot at exoplanets we need to sharpen our capabilities, as a continuation of the success story in world record breaking, at a time launching of 104 satellites on 15th February, 2017. To familiarize with the existing scenario in space technology and space voyages I cover below some recent studies. If they excite your inquisitiveness a significant volume of literature is there to satiate your thirst for enhancing your knowledge base.

***NASA Shortlists Three Landing Sites for Mars 2020**

Mars 2020 is targeted for launch in July 2020 aboard an Atlas V 541 rocket from Space Launch Complex 41 at Cape Canaveral Air Force Station in Florida. The rover will conduct geological assessments of its landing site on Mars, determine the habitability of the environment, search for signs of ancient Martian life, and assess natural resources and hazards for future human explorers. It will also prepare a collection of samples for possible return to Earth by a future mission.

Participants in a landing site workshop for NASA's upcoming Mars 2020 mission have recommended three locations on the Red Planet for further evaluation. The three potential landing sites for NASA's next Mars rover include Northeast Syrtis (a very ancient portion of Mars' surface), Jezero crater, (once home to an ancient Martian lake), and Columbia Hills (potentially home to an ancient hot spring, explored by NASA's Spirit rover). There were 240 participants in the Feb. 8-10, 2017 workshop in Monrovia, California, and up to 60 who engaged online. More information on the landing sites can be found at:http://mars.nasa.gov/mars2020/mission/timeline/prelaunch/landing-site-selection/
NASA's Jet Propulsion Laboratory will build and manage operations of the Mars 2020 rover for the NASA Science Mission Directorate at the agency's headquarters in Washington. For more information about NASA's Mars programs, visit:http://www.nasa.gov/mars

***New timeline for our solar system estimated**

Astronomers have established a new timeline for the solar system that is helping to pinpoint when gas giants Jupiter and Saturn likely formed. Approximately 4.6 billion years ago, a swirling cloud of hydrogen gas and dust known as the solar nebula collapsed in on itself, giving way to the birth of the sun. The leftover material from this massive explosion then clumped together to form the planets, in a process called core accretion.

A new study suggests Jupiter and Saturn likely took shape within the first 4 million years of the solar system's formation, which further supports the core accretion model. Weiss and lead author Huapei Wang, a postdoctoral student at MIT, studied the magnetic orientations of four ancient meteorites called angrites. They fell to Earth at different times and were found in Brazil, Argentina, Antarctica and the Saharan desert. This type of space rock acts as a good marker for what the cosmic environment was like during the early days of the solar system. When the solar nebula was present, it generated a substantial magnetic field, which would in turn be recorded in meteorites formed during this time. However, the researchers observed little to no remnant magnetization in the oldest of the four angrites, which formed 3.8 million years after the formation of the solar system. That lack of magnetization suggests the gas and debris of the solar nebula had already dissipated by that time. Thus, the solar system's large-scale structure, including Jupiter and Saturn, must have already been established. Solar systems form out of the condensation of a gaseous nebula. The two scientists found an accurate and precise age for the lifetime of our solar system's ancient [solar] nebula and the magnetic field. They found that the [solar] nebula and [magnetic] field had dispersed 3.8 million years after the formation of the solar system.

The study, published on Feb. 9, 2017 in the journal Science, offers a more precise estimate of the solar nebula's lifetime and will therefore help to determine when and how other planets formed in the solar system. Since the solar nebula lifetime critically affects the final positions of Jupiter and Saturn, it also affects the later formation of the Earth, our home, as well as the formation of other terrestrial planets. The researchers said they plan to study other primitive asteroid samples to be collected by the Hayabusa 2 spacecraft and NASA's OSIRIS-REx mission, which are expected to return to Earth in the early 2020s. (**Source:** http://www.space.com/35662-solar-system-evolution-giant-planet-formation.html)

***Hubble Has Found the Ancient Galaxies That Gave the Universe Its First Light**

A new technique that removes the light of foreground galaxy clusters is giving astronomers a direct look at a generation of galaxies dating back to the universe's baby years. The discovery is considered a key piece of evidence for a critical, but poorly understood period of time when the universe switched from being dark to radiating light. Scientists theorize that energy from first-generation galaxies transformed the dark, electrically neutral universe into ionized and radiating plasma. But these faint galaxies are not easy to find.

University of Texas astronomer Rachael Livermore and colleagues describe a successful hunt thanks to a new technique that combines deep-field Hubble Space Telescope images with what is known as "wavelet decomposition" — a light-masking equivalent of noise-cancelling headphones — to computationally remove light from foreground galaxy clusters. The wavelet transform allows us to decompose an image into its components on different physical scales. Thus, one can isolate structures on large scales… and remove them, allowing objects on smaller scales to be identified more easily. Ironically, astronomers first have to rely on galaxy clusters, which warp spacetime with their massive gravity, to serve as naturally occurring lenses that boost Hubble's resolving power more than 100 times.

By then masking the light, Livermore, University of Texas astronomer Steven Finkelstein and Space Telescope Science Institute astronomer Jennifer Lotz found 167 galaxies that are 10 times fainter than any previously known, a number that shows "strong support" for how many early galaxies would have been needed to re-ionize the universe.

A more direct detection method will come after Hubble's successor, the James Webb Space Telescope, is launched next year.

(**Source:** http://www.space.com/35668-hubble-frontier-fields-lensing-astronomy-universe-ancient-galaxies.html)

***More Alien Worlds? New Data Haul Identifies 100+ Possible Exoplanets**

Astronomers have spotted more than 100 new potential alien planets, including one in the fourth-closest star system to the sun, a new study reports. This haul of newfound possible exoplanets, which have yet to be confirmed as bona fide alien worlds, comes from a new analysis of 20 years' worth of data gathered by the HIRES (High Resolution Echelle Spectrometer) instrument at the Keck Observatory in Hawaii.

HIRES detects exoplanets using the "radial velocity" method: The instrument picks up the tiny gravitational wobbles that orbiting worlds induce in their parent stars. This strategy is different from that employed by the most prolific planet hunter of all time, NASA's Kepler space telescope; Kepler watches for the tiny brightness dips caused when a planet crosses its star's face — called the "transit method." In the new study, the researchers identified 60 so-called planet candidates, as well as 54 other suggestive signals that require further investigation before they can be elevated to candidate status.

One of the official candidates circles the star GJ 411 (also known as Lalande 21185), which lies just 8.3 light-years from the sun. Only three star systems are closer. (The three-star Alpha Centauri is the nearest system to the sun. Last August, astronomers announced the discovery of a potentially Earth-like world orbiting Proxima Centauri, one of the Alpha Centauri trio. Proxima Centauri lies 4.22 light-years from Earth.) The possible GJ 411 planet is at least 3.8 times more massive than Earth, and it's probably too hot to be habitable, study team members said. The candidate world lies quite close to the star, completing one orbit every 10 Earth days.

The huge HIRES data set consists of nearly 61,000 measurements of more than 1,600 stars. To wring the most science possible out of this catalog — which study team members called the biggest compilation of radial-velocity planet-hunting observations ever the HIRES researchers have shared it with other exoplanet — researchers around the world. The best way to advance the field and further our understanding of what these planets are made out of is to harness the abilities of a variety of precision radial velocity instruments, and deploy them in concert. The new study, which was led by Paul Butler of the Carnegie Institution for Science in Washington, D.C., was published in The Astronomical Journal. To date, astronomers have discovered 3,450 confirmed exoplanets, about two-thirds of which were found by Kepler. Several thousand more await confirmation. And the finds should keep rolling in well into the future. For example, the European Space Agency's Gaia mission, which launched in December 2013, is expected to discover thousands of alien worlds before its work is done, as is NASA's Transiting Exoplanet Survey Satellite (TESS), which is scheduled to lift off in early 2018.

(**Source:** http://www.space.com/35687-100-potential-exoplanets-found-hires.html)

PSLV-C37 Successfully Launches 104 Satellites in a Single Flight

In its thirty ninth flight (PSLV-C37), ISRO's Polar Satellite Launch Vehicle successfully launched the 714 kg Cartosat-2 Series Satellite along with 103 co-passenger satellites on February 15, 2017 from Satish Dhawan Space Centre SHAR, Sriharikota. This is the thirty eighth consecutively successful mission of PSLV. The total weight of all the 104 satellites carried on-board PSLV-C37 was 1378 kg.

PSLV-C37 lifted off at 0928 hrs (9:28 am) IST, as planned, from the First Launch Pad. After a flight of 16 minutes 48 seconds, the satellites achieved a polar Sun Synchronous Orbit of 506 km inclined at an angle of 97.46 degree to the equator (very close to the intended orbit) and in the succeeding 12 minutes, all the 104 satellites successfully separated from the PSLV fourth stage in a predetermined sequence beginning with Cartosat-2 series satellite, followed by INS-1 and INS-2. The total number of Indian satellites launched by PSLV now stands at 46.

After separation, the two solar arrays of Cartosat-2 series satellite were deployed automatically and ISRO's Telemetry, Tracking and Command Network (ISTRAC) at Bangalore took over the control of the satellite. In the coming days, the satellite will be brought to its final operational configuration following which it will begin to provide remote sensing services using its panchromatic (black and white) and multispectral (colour) cameras.

Of the 103 co-passenger satellites carried by PSLV-C37, two – ISRO Nano Satellite-1 (INS-1) weighing 8.4 kg and INS-2 weighing 9.7 kg – are technology demonstration satellites from India.

The remaining 101 co-passenger satellites carried were international customer satellites from USA (96), The Netherlands (1), Switzerland (1), Israel (1), Kazakhstan (1) and UAE (1).

With successful launch, the total number of customer satellites from abroad launched by India's workhorse launch vehicle PSLV has reached 180.

(**Source:** http://isro.gov.in/update/15-feb-2017/pslv-c37-successfully-launches-104-satellites-single-flight)

Outstanding Contribution

Significant scientific studies have been carried out by many illustrious sons of India, Prof.C.V.Raman, Prof.Jagadish Chandra Bose, Prof.Ramanujam to name a few. Following their footsteps many carried out outstanding scientific research covering basic and applied branches of physical, chemical and life sciences. In earth Sciences we produced both theoretical as well as field scientists of international repute. Similarly in almost all the branches of Physical, chemical and life sciences significant contributions have been made by number of scientists of international repute.

I have covered in the News & Views section very senior earth system scientists who have made significant contributions to propagate the importance of this branch of science by bringing into focus the importance of solid earth, oceans, atmosphere & space. I selected some of those living legends to motivate our young researchers in carrying out such research studies that are basically useful to our society. There are many more who have contributed significantly in propagating the importance of our country`s area specific natural wealth. Due to some limitations I could not continue "Living Legends" subsection. I found it difficult to gather sufficient information about some of the stalwarts. I regret the subsection`s discontinuity. As and when I am confident that sufficient data has been gathered I will reintroduce it. Till then please bear with me.

Since scientific research in our country has to attain and maintain international standards it is essential for our young researchers to get motivated by going through the outstanding contributions made even in other branches of science. To achieve this I started from November 2016 issue the noteworthy and outstanding contributions made by those scientists who helped in propagating the importance of Indian Science in general and

steps essential to address problems faced by the vulnerable segments of our society in particular through their path breaking scientific contributions in their fields of expertise. I have covered outstanding contribution to Indian Space Programme by Dr.Krishnaswamy Kasturirangan, outstanding contribution to Atomic Energy and India's Nuclear Weapons Programme by Dr.Rajagopala Chindambaram and outstanding contribution to Indian Food Security by Mankombu Sambasivan Swaminathan (Architect of Green Revolution). In this issue I have included the outstanding contributions made by Prof.C.N.R.Rao, well known expert in solid state and materials chemistry.

Prof.C.N.R. Rao

C.N.R. Rao was born in Bangalore in 1934. He attended Acharya Patashala high school in Basavanagudi, which made a lasting influence on his interest in chemistry. His father enrolled him to a Kannada-medium course to encourage his mother tongue, but at home used English for all conversation. He completed secondary school leaving certificate in first class in 1947. He studied BSc at Central College, Bangalore. His first research paper was published in the *Agra University Journal of Research* in 1954.

Research Expertise

Chintamani Nagesa Ramachandra Rao (C.N.R. Rao) is an Indian chemist, distinguished as one of the leading solid state and materials chemists around the world. His scientific career spanning over five decades saw him making significant contribution in development of the field that included his analysis on transition metal oxides. The study aided in comprehending the novel phenomenon and association of materials properties with that of structural chemistry of such materials. He was a front-runner in synthesizing two dimensional oxide materials like La2CuO4. For last twenty years, apart from working on hybrid materials, he has been making significant contribution to nanomaterials.

Professional Achievements

Professor C.N.R. Rao is the Linus Pauling Research Professor and Honorary President of the Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore. His main research interests are in solid state and materials chemistry, surface phenomena, spectroscopy and molecular structure. He is an author of over 1000 research papers and 36 books. He received the M.Sc. degree from Banaras, Ph.D. from Purdue, D.Sc. from Mysore universities and has received honoris causa doctorate degrees from 32 universities including Purdue, Bordeaux, Banaras, Mysore, IIT Bombay, IIT Kharagpur, Notre Dame, Novosibirsk, Uppsala, Wales, Wroclaw, Caen, Khartoum and Sri Venkateswara University. Besides being Fellow of the Indian National Science Academy and the Indian Academy of Sciences, Professor Rao is a Fellow of the Royal Society, London, Foreign Associate of the National Academy of Sciences, U.S.A., Foreign Member of the Russian Academy of Sciences, French Academy of Sciences, Japan Academy as well as the Polish, Czechoslovakian, Serbian, Slovenian, Brazil, Spanish, Korean and African Academies and the American Philosophical Society. He is a Member of the Pontifical Academy of Sciences, Foreign Member of Academia Europaea and Foreign Fellow of the Royal Society of Canada. He is on the editorial boards of 15 leading professional journals.

Awards and Recognition

Among the various medals, honours and awards received by him, mention must be made of the Marlow Medal of the Faraday Society (1967), Bhatnagar Prize (1968), Jawaharlal Nehru Fellowship (1973), Padma Shri (1974), Sir C.V. Raman Award (1975), Centennial Foreign Fellowship of the American Chemical Society (1976), S.N. Bose Medal of the Indian National Science Academy (1980), Royal Society of Chemistry (London) Medal (1981), Padma Vibhushan (1985), Honorary Fellowship of the Royal Society of Chemistry, London (1989), Hevrovsky Gold Medal of the Czechoslovak Academy (1989), Meghnad Saha Medal of the Indian National Science Academy (1990), Blackett Lectureship of the Royal Society (1991), CSIR Golden Jubilee Prize in physical sciences (1991), TWAS Medal in Chemistry (1995), Einstein Gold Medal of UNESCO (1996), Linnett Professorship of the University of Cambridge (1998), Centenary Lectureship and Medal of the Royal Society of Chemistry, London (2000), the Hughes Medal of the Royal Society, London for original discovery in physical sciences (2000), Karnataka Ratna (2001) by the Karnataka Government, the Order of Scientific Merit (Grand-Cross) from the President of Brazil (2002), Commander of the Order of Rio Branco from Brazil (2002) and the Gauss Professorship of Germany (2003), Order of Friendship(2009), National order of Scientific Merit(2012), Bharat Ratna (2013), Order of the Rising Sun (2015). Professor Rao is the President of the Third World Academy of Sciences, Member of the Atomic Energy Commission of India and of the Executive Board of the Science Institutes Group, Princeton, and Chairman, Indo-Japan Science Council. Prof. Rao was President of the Indian National Science Academy (1985-86), the Indian Academy of Sciences (1989-91), the International Union of Pure and Applied Chemistry (1985-87), the Indian Science Congress Association (1987-88), the Materials Research Society of India (1989-91) and Chairman, Advisory Board of the Council of Scientific and Industrial Research (India). He was the Director of the Indian Institute of Science (1984-94), Chairman of the Science Advisory Council to Prime Minister Rajiv Gandhi (1985-89) and Chairman, Scientific Advisory Committee to the Union Cabinet (1997-98), and Albert Einstein Research Professor (1995-99).

P.R.Reddy